DRAFT

APPLICATION		REVISIONS			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED
84-08001	5487				

1. PREPARED IN ACCORDANCE WITH MIL-STD-100.
2. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

ON-SITE TEST PROCEDURE
FBIS ANTENNA CONTROL SYSTEM
ESI PART NUMBER 84-08001

REV																					
SHEET	19	20	21	22																	
REV STATUS OF SHEETS	REV																				
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		

CONTRACT NO.

ELECTROSPACE SYSTEMS, INC.
RICHARDSON, TEXAS 75080

APVD		84-06-19
ENGR		--------
ENGR		84-06-19
CHECK		84-06-19
DRAWN		84-06-19

PROJECT DRAFTSMAN: E.A.

DRAWING TITLE

ON-SITE TEST PROCEDURE
FBIS ANTENNA CONTROL SYSTEM

STAT

SIZE	FSCM NO.	DRAWING NO.
A	33875	84-08008-000

STAT

SCALE

SHEET 1 OF 22

77ASC026A

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LIST OF ILLUSTRATIONS

1.0 SCOPE

This test procedure details the system checks, tests, and measurement to insure proper installation and performance of the FBIS Servo Control Systems. These tests are specifically designed to verify proper unit interconnections and to ascertain system performance levels not possible during factory tests. All data and notes recorded during the test performance are to be considered a portion of the test procedure and are attached hereto.

2.0 REFERENCE DOCUMENTS

ESI System Interface Specification 84-08002-000.

3.0 REQUIREMENTS

3.1 GENERAL

The tests prescribed herein shall govern the acceptance of the FBIS Servo Control System with respect to performance of the drive systems, control and display functions, system interlocks and fault functions, antenna movement range and dynamic performance, including velocity and acceleration.

3.2 TEST METHODS

The test methods and system configurations prescribed herein shall be mandatory in the conduction of the tests except for those cases in which special conditions existing at the time of test dictate certain modifications or changes. In these circumstances, full documentation of the condition and nature of the changes shall be provided and recorded on the test data sheets.

3.3 TEST CONDITIONS

a. It is assumed that all antenna mechanical tests and alignments have been completed.

b. Prior to this test, the antenna position readout will have been checked and aligned.

3.4 TEST EQUIPMENT REQUIRED

a. Chart Recorder - Brush, Model 220 or equivalent

b. Function Generator - Wavetek Model 110 or equivalent

c. ESI Position Test Set

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77CS0288 (VERTICAL)

4.0 DETAILED TEST

4.1 FAULT STATUS REPORTING

Set all circuit breakers on and close all interlock switches on the antenna. Apply power to the ACU.

Unit power on in STANDBY Mode. Disable MONITOR if it is on. _____(CHECK)

4.1.1 Individual Fault Status

Open each circuit breaker and interlock switch listed on Table I individually. Note that the status message displayed on the ACU and axis disable agrees with Table 1. Those with an * in the alarm column should cause the alarm lamp on the ACU to flash red. Place ACU in MAN POS mode, zero command, for all checks. Thermostats and phase loss faults may be tested by removing connections in junction boxes, or at drive cabinet. Reclose or reconnect each circuit before next test.

4.1.2 Multiple Fault Status

4.1.2.1 Activate any alarm condition. _____(CHECK)

Press the ALARM switch on the ACU. _____(CHECK)

ALARM switch changes to solid yellow. _____(CHECK)

4.1.2.2 Activate another alarm condition. _____(CHECK)

ALARM switch reverts to flashing red. _____(CHECK)

Asterisk in message display and messages alternate. _____(CHECK)

4.1.2.3 Press the ALARM switch.

ALARM switch is yellow. _____(CHECK)

Messages alternate. _____(CHECK)

4.1.2.4 Remove one alarm.

ALARM switch is yellow. _____(CHECK)

Asterisk not present. _____(CHECK)

4.1.2.5 Remove last alarm.

ALARM switch is off. _____(CHECK)

Data section of display is blank. _____(CHECK)

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TABLE I: SYSTEM AND AXIS FAULT STATUS

SWITCH	MESSAGE	ALARM	AXIS DISABLED AZ	AXIS DISABLED EL	CHECK
AZ #1 EMERGENCY	AZ1 EMERGENCY	*	*	*	____
AZ #2 EMERGENCY	AZ2 EMERGENCY	*	*	*	____
EL EMERGENCY	EL EMERGENCY	*	*	*	____
DISH DOOR EMERGENCY	DISH DOOR EMER	*	*	*	____
INPUT BREAKER	3 PHASE PWR LOSS	*	*	*	____
AZ HANDCRANK	AZ HANDCRANK	*	*		____
AZ BRAKE INTERLOCK	AZ BRAKE INTERLK	*	*		____
AZ BRAKE FAULT	AZ BRAKE FAULT	*			____
LOW ANGLE	LOW ANGLE	*			____
EL HANDCRANK	EL HANDCRANK	*		*	____
EL BRAKE INTERLOCK	EL BRAKE INTERLK	*		*	____
EL BRAKE FAULT	EL BRAKE FAULT	*			____
AZ #1 FIELD CURRENT OR CB	AZ1 FIELD FAULT	*			____
AZ #2 FIELD CURRENT OR CB	AZ2 FIELD FAULT	*			____
AZ #1 ARMATURE CB	AZ1 MTR CONTROL	*			____
AZ #2 ARMATURE CB	AZ2 MTR CONTROL	*			____
AZ #1 ELECTRONICS CB	AZ1 MTR CONTROL	*			____
AZ #2 ELECTRONICS CB	AZ2 MTR CONTROL	*			____
AZ #1 MOTOR THERMOSTAT	AZ1 MTR OVERTEMP	*			____
AZ #2 MOTOR THERMOSTAT	AZ2 MTR OVERTEMP	*			____
AZ #1 BLOWER CB	AZ BLOWER CB	*			____
AZ #2 BLOWER CB	AZ BLOWER CB	*			____
EL FIELD CURRENT OR CB	EL FIELD FAULT	*		*	____
EL ARMATURE CB	EL1 MTR CONTROL	*		*	____
EL ELECTRONICS CB	EL1 MTR CONTROL	*		*	____
EL MOTOR THERMOSTAT	EL MTR OVERTEMP	*		*	____
EL BLOWER CB	EL BLOWER CB	*			____

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4.1.3 Current Fault Status

4.1.3.1 Disable AZ Motor #2 assembly using Armature CB. With ACU in Manual mode zero rate command inject a 2.7 volt signal at A1 (A6) BJ2-24. (Open BJ2-24 and inject 2.7 volt at C20-4). Note within 10 seconds an axis shut down with a current fault being reported for AZ(EL) #1 Motor. Message should read AZ1 CURRENT FAULT (EL CURRENT FAULT).

AZ _____ (EL) _____(CHECK)

4.1.3.2 Clear the current fault by depressing the axis disable switch on the ACU and re-enable Motor #2 Armature CB. Disable Motor #1 assembly and repeat 4.1.3.1 for AZ #2 Motor looking for an AZ 2 Current Fault. (Open BJ2-25 and inject 2.7 volt at C28-3.) Re-enable Motor #1 assembly and clear the current fault by depressing the axis disable switch on the ACU. _____(CHECK)

4.2 TRAVEL LIMIT TEST

4.2.1 Azimuth CW

4.2.1.1 Drive the azimuth axis CW and record the angle at which the azimuth PRELIMIT interlock is tripped.

ANGLE_____(RECORD)

Message "AZ CW PRELIMIT" _____(CHECK)

4.2.1.2 Verify that the antenna will drive in a CCW direction at a slow rate while the MANUAL rate button is being pushed until the PRELIMIT is cleared. _____(CHECK)

4.2.1.3 Defeat the PRELIMIT interlock and continue to drive the azimuth axis CW. Record the angle at which the FINAL LIMIT interlock is tripped.

ANGLE_____(RECORD)

Message "AZ CW LIMIT" _____(CHECK)

4.2.1.4 Verify that the azimuth drives are disabled. _____(CHECK)

Use handcranks to drive out of the limit area. Restore PRELIMIT interlock.

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4.2.2 Azimuth CCW

4.2.2.1 Drive the azimuth axis CCW and record the angle at which the azimuth PRE-LIMIT interlock is tripped.

ANGLE_____(RECORD)

Message "AZ CCW PRELIMIT" _____(CHECK)

4.2.2.2 Verify that the antenna drives in a CW direction at a slow rate while the MANUAL rate button is being pushed until the prelimit is cleared. _____(CHECK)

4.2.2.3 Defeat the PRELIMIT interlock and continue to drive the azimuth axis CCW and record that angle at which the FINAL LIMIT interlock is tripped.

ANGLE_____(RECORD)

Message "AZ CCW LIMIT" _____(CHECK)

4.2.2.4 Verify that the azimuth drives are disabled. _____(CHECK)

Use handcranks to drive out of limit area. Restore PRELIMIT interlock.

4.2.3 Elevation Up

4.2.3.1 Drive the elevation axis UP and record the angle at which the elevation PRELIMIT interlock is tripped.

ANGLE_____(RECORD)

Message "EL UP PRELIMIT" _____(CHECK)

4.2.3.2 Verify that the antenna drives in a DOWN direction at a slow rate while the MANUAL rate button is being pushed until the prelimit is cleared. _____(CHECK)

4.2.3.3 Defeat the PRELIMIT interlock and continue to drive the elevation axis UP. Record the angle at which the FINAL LIMIT indicator is tripped.

ANGLE_____(RECORD)

Message "EL UP LIMIT" _____(CHECK)

4.2.3.4 Verify that the elevation drives are disabled. Use handcranks to drive out of limit area. Restore PRELIMIT interlock. _____(CHECK)

4.2.4 Elevation Down

4.2.4.1 Drive the elevation axis DOWN and record the angle at which the elevation PRELIMIT interlock is tripped.

ANGLE_____(RECORD)

Message "EL DOWN PRELIMIT" _____(CHECK)

4.2.4.2 Verify that the antenna drives in the UP direction at a slow rate while the MANUAL rate button is being pushed until the limit is cleared. _____(CHECK)

4.2.4.3 Defeat the PRELIMIT interlock and continue to drive the elevation axis DOWN. Record the angle at which the FINAL LIMIT indicator is tripped.

ANGLE_____(RECORD)

Message "EL DOWN LIMIT" _____(CHECK)

4.2.4.4 Verify that the elevation drives are disabled. _____(CHECK)

4.2.4.5 Use handcranks to drive out of limit area. Restore PRELIMIT interlock.

4.3 MANUAL MODES TEST

4.3.1 Manual Enable

4.3.1.1 Select the MANUAL ENABLE mode and verify that the speed and direction of antenna movement can be controlled by the rate controls on the ACU.

AZ _____ (EL) _____(CHECK)

4.3.1.2 Command a full velocity for each direction of each axis and record the angle through which the axis travels during a one-minute interval:

AZ CW _____ (RECORD) AZ CCW _____ (RECORD)

EL UP _____ (RECORD) EL DN _____ (RECORD)

4.3.1.3 Calculate velocity in degrees per second:

AZ CW _____ (RECORD) AZ CCW _____ (RECORD)

EL UP _____ (RECORD) EL DN _____ (RECORD)

4.3.2 SLEW Enable

4.3.2.1 Select the SLEW ENABLE mode and verify that the speed and direction of antenna movement can be controlled by the rate controls on the ACU.

AZ _____ (EL) _____(CHECK)

4.3.2.2 Command a full velocity for each direction of each axis and record the angle through which the axis travels during a one-minute interval:

AZ CW _____ (RECORD) AZ CCW _____ (RECORD)

EL UP _____ (RECORD) EL DN _____ (RECORD)

4.3.2.3 Calculate velocity in degrees per second:

AZ CW _____ (RECORD) AZ CCW _____ (RECORD)

EL UP _____ (RECORD) EL DN _____ (RECORD)

4.3.3 Monitor Test

4.3.3.1 Select SLEW ENABLE mode and place command at zero. Enable the monitor by pressing MONITOR.

MONITOR illuminates green _____(CHECK)

4.3.3.2 Give a full CW (UP) command. The monitor circuit should cause the mode to revert to STANDBY within 1.0 seconds.

Reverts within limit. AZ _____ (EL) _____(CHECK)

Monitor is red. AZ _____ (EL) _____(CHECK)

NOTE: MONITOR TIME constant switch must be in position 4.

4.3.3.3 Return command to zero and reset monitor. Repeat for CCW (DN) command.

Reverts within limit. AZ _____ (EL) _____(CHECK)

Monitor is red. AZ _____ (EL) _____(CHECK)

4.3.4 Remote Control Box

4.3.4.1 Connect the remote control box at the drive cabinet. Verify that control of the antenna is not possible until the ACU is in REMOTE mode. _____(CHECK)

4.3.4.2 With ACU in REMOTE mode, verify that the speed and direction of antenna movement can be controlled from the remote control box.

AZ _____ (EL) _____(CHECK)

4.3.4.3 Repeat paragraphs 4.3.4.1 and 4.3.4.2 with the remote control box connected at the portable control junction box.

4.3.4.1 _____(CHECK)

4.3.4.2 AZ _____ (EL) _____(CHECK)

4.4 AUTO MODES TEST

4.4.1 Manual Position

4.4.1.1 Select MANUAL POSITION mode at the ACU. Verify that speed and direction of antenna movement can be controlled by the ACU rate controls.

AZ _____ (EL) _____(CHECK)

4.4.1.2 Set command to zero, record position and verify that there is no more than 0.01 degrees of drift over a two minute period.

AZ _____ degrees (RECORD)

EL _____ degrees (RECORD)

No drift. AZ _____ (EL) _____(CHECK)

4.4.2 20 Satellite Positions

4.4.2.1 Put DATA section of display into DISPLAY KEYBOARD mode. Store a command position for Satellite 1 Azimuth and Satellite 1 Elevation. Record below.

S01 AZ _____ degrees (RECORD)

S01 EL _____ degrees (RECORD)

4.4.2.2 Place the ACU in SAT 1 mode. The system should drive to the stored command position. Record position after the system settles. Actual position should equal command position $\pm$0.01 degrees.

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

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4.4.2.3 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 2 positions.

S02 AZ _____ degrees (RECORD)

S02 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.4 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 3 positions.

S03 AZ _____ degrees (RECORD)

S03 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.5 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 4 positions.

S04 AZ _____ degrees (RECORD)

S04 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.6 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 5 positions.

S05 AZ _____ degrees (RECORD)

S05 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.7 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 6 positions.

S06 AZ _____ degrees (RECORD)

S06 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.8 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 7 positions.

S07 AZ _____ degrees (RECORD)

S07 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.9 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 8 positions.

S08 AZ _____ degrees (RECORD)

S08 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.10 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 9 positions.

S09 AZ _____ degrees (RECORD)

S09 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.11 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 10 positions.

S10 AZ _____ degrees (RECORD)

S10 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.12 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 11 positions.

S11 AZ _____ degrees (RECORD)

S11 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.13 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 12 positions.

S12 AZ _____ degrees (RECORD)

S12 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.14 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 13 positions.

S13 AZ _____ degrees (RECORD)

S13 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.15 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 14 positions.

S14 AZ _____ degrees (RECORD)

S14 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.16 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 15 positions.

S15 AZ _____ degrees (RECORD)

S15 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.17 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 16 positions.

S16 AZ _____ degrees (RECORD)

S16 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.18 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 17 positions.

S17 AZ _____ degrees (RECORD)

S17 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.19 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 18 positions.

S18 AZ _____ degrees (RECORD)

S18 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.20 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 19 positions.

S19 AZ _____ degrees (RECORD)

S19 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.21 Repeat paragraphs 4.4.2.1 and 4.4.2.2 for Satellite 20 positions.

S20 AZ _____ degrees (RECORD)

S20 EL _____ degrees (RECORD)

Azimuth Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

Elevation Actual_____degrees (RECORD)

[Actual - Command] $\leq$ 0.01 deg_____degrees (CHECK)

4.4.2.22 Place ACU in STANDBY mode.

4.5 SYSTEM RESPONSE TEST

4.5.1 Rate Loop Tests

4.5.1.1 Set-up

4.5.1.1.1 Remove the rate command from the input to the rate loop and replace with a function generator.

AZ _____ (EL) _____(CHECK)

4.5.1.1.2 Monitor the output of the function generator with one channel of the chart recorder and tachometer rate feedback A1A1B17-7 with the other.

AZ _____ (EL) _____(CHECK)

4.5.1.1.3 Place system in MANUAL ENABLE.

AZ _____ (EL) _____(CHECK)

4.5.1.2 Minimum Smooth Velocity

4.5.1.2.1 Calibrate chart recorder so that .02 deg/sec equals full scale on both channels.

AZ _____ (EL) _____(CHECK)

4.5.1.2.2 Set function generator to generate a .1 Hz triangular wave with zero DC offset.

AZ _____ (EL) _____(CHECK)

4.5.1.2.3 Adjust amplitude of triangular wave for a peak of .02 deg/sec.

AZ _____ (EL) _____(CHECK)

4.5.1.2.4 Record several cycles of the COMMAND and TACH voltages on the chart recorder.

AZ _____ (EL) _____(CHECK)

4.5.1.2.5 Note point at which antenna velocity drops to zero as seen by the recorded TACH voltage. Record below. It should be less than .01 deg/sec.

AZIMUTH CW _____degrees/second (RECORD)

AZIMUTH CCW _____degrees/second (RECORD)

ELEVATION UP _____degrees/second (RECORD)

ELEVATION DN _____degrees/second (RECORD)

4.5.1.3 Small Signal Step Response

4.5.1.3.1 Select the square wave output of the function generator and adjust the amplitude for 1 volt peak to peak at .2 Hz.

AZ _____ (EL) _____(CHECK)

4.5.1.3.2 Record several cycles of the COMMAND and TACH voltages on the chart recorder.

AZ _____ (EL) _____(CHECK)

4.5.1.3.3 Record overshoot.

AZ _____ percent (RECORD)

(EL)_____ percent (RECORD)

4.5.1.4 Large Signal Step Response

4.5.1.4.1 Adjust the amplitude of the function generator output to 10 volts peak to peak.

AZ _____ (EL) _____(CHECK)

4.5.1.4.2 Record several cycles of the COMMAND and TACH voltages on the chart recorder.

AZ _____ (EL) _____(CHECK)

4.5.1.4.3 Record Overshoot.

AZ _____ $\leq$ 25 percent (RECORD)

(EL)_____ $\leq$ 25 percent (RECORD)

4.5.1.5 Acceleration

Using the above recordings, measure the maximum slope of the TACH feedback and calculate acceleration.

4.5.1.6 Rate Loop Bandwidth and Locked Rotor Resonance

4.5.1.6.1 Set the sine wave output of the function generator to 1 volt peak to peak. With the chart recorder running, slowly sweep the frequency of the function generator upward (making sure the output of the function generator remains constant) until the system no longer responds as indicated by the chart recording.

CAUTION

AN OBSERVER SHOULD BE PLACED NEAR THE ANTENNA READY TO DISABLE THE DRIVE AS THE FUNCTION GENERATOR PASSES THROUGH THE RESONANT FREQUENCY OF THE ANTENNA, IF DAMAGE TO THE ANTENNA SEEMS LIKELY.

4.5.1.6.2 From the above recording, determine the frequency at which the output voltage from the TACH has decreased 3 dB.

Azimuth Rate Loop Bandwidth_____(RECORD)

Elevation Rate Loop Bandwidth_____(RECORD)

4.5.1.6.3 From the above recording, determine the Locked Rotor Resonance by looking for a definable null of the TACH voltage.

Azimuth Locked Rotor Resonance_____(RECORD)

Elevation Locked Rotor Resonance_____(RECORD)

4.5.1.6.4 Place system in STANDBY and disconnect the function generator and chart recorder.

AZ _____ (EL) _____(CHECK)

4.5.1.6.5 Restore the rate command connection.

AZ _____ (EL) _____(CHECK)

4.5.2 Position Loop Test

4.5.2.1 Set-Up

4.5.2.1.1 The ESI Position Test Set is used for this group of tests. Connect the eight least significant bits of each axis to the test set. _____(CHECK)

4.5.2.1.2 Connect each output of the test set to a channel on the chart recorder. _____(CHECK)

4.5.2.2 Large Signal Step Response

4.5.2.2.1 Place coordinates for Satellite 1 and Satellite 2 into the system that will cause a 1 degree step to be applied to each axis when changing between them.

SØ1 AZ_____ EL _____(RECORD)

SØ2 AZ_____ EL _____(RECORD)

4.5.2.2.2 Position antenna to Satellite 1 coordinates, then select Satellite 2 and record position response on chart recorder. Switch between Satellite 1 and Satellite 2 several times and record on chart recorder. _____(CHECK)

4.5.2.2.3 System should settle within 1-1/2 cycles and have less than 25 percent overshoot. Overdamped response is acceptable. _____(CHECK)

4.5.2.3 Position Loop Bandwidth

4.5.2.3.1 Perform this test on Azimuth first then on Elevation. Set the STC Parameter to 255. _____(CHECK)

4.5.2.3.2 Connect the function generator through a 1 megohm resistor to U22-8 for Azimuth and U26-8 for Elevation of the AUTO CONTROL CARD (A2) of the DACU.

AZ _____ (EL) _____(CHECK)

4.5.2.3.3 Connect the output of the test set for the axis under test to one channel of the chart recorder and the function generator to the other channel.

AZ _____ (EL) _____(CHECK)

4.5.2.3.4 Select a .01 Hz sine wave from the function generator and set amplitude to zero.

AZ _____ (EL) _____(CHECK)

4.5.2.3.5 Place the system in MANUAL POSITION mode in position hold and slowly increase amplitude of the sine wave until a .02 degree peak to peak movement of the antenna is seen. [For increased resolution beyond that of the readouts the Azimuth POSITION ERROR (R9-R7) and Elevation POSITION ERROR (R12-R10) registers can be called up on the DACU.]

4.5.2.3.6 Calibrate the test set for an approximate full scale deflection of the chart recorder.

AZ _____ (EL) _____(CHECK)

4.5.2.3.7 With the chart recorder running, slowly sweep the frequency of the function generator upward (making sure the output of the function generator remains constant) until system no longer responds as indicated by the chart recording.

AZ _____ (EL) _____(CHECK)

4.6 Parameter Record

Configure the system for normal operation. Record the following parameters.

AES_____	BA3_____	ESF_____
AOS_____	BO3_____	ESR_____
ASF_____	CO1_____	ETA_____
ASR_____	CA1_____	ETO_____
ATO_____	CO2_____	PSA_____
ATA_____	CA2_____	PSO_____
BA1_____	CO3_____	SAS_____
BO1_____	CA3_____	SOS_____
BA2_____	EES_____	STC_____
BO2_____	EOS_____	SRC_____

NOTE: ASF (ESF) must be entered before AOS (EOS).

END OF TEST

COMMENTS

WITNESS _____ DATE _____

FOR _____

WITNESS _____ DATE _____

FOR _____

WITNESS _____ DATE _____

FOR ELECTROSPACE SYSTEMS, INC.

	SIZE	FSCM NO.	DRAWING NO.
	A	33875	84-08008-000
WANG ID. NO. 0116D	SCALE		SHEET 22

77CS028B (VERTICAL)